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KIMBERLY-CLARK WORLDWIDE, INC. [/];
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(). MCGRATH, Kevin [/]; (). GREEN, Theodore, M. ; ().

Published

(54) Title: PATTERNED BINDING OF FUNCTIONALIZED MICROSPHERES FOR OPTICAL DIFFRACTION-BASED BIOSENSORS

(54) Titre: LIAISON A MOTIFS DE MICROSPHERES FONCTIONNALISEES DESTINEES A DES BIOCAPTEURS BASES SUR LA DIFFRACTION OPTIQUE

(57) Abstract

The present invention provides an inexpensive and sensitive system and method for detecting analytes present in a medium. The system comprises a diffraction enhancing element, such as functionalized microspheres, which are modified such that they are capable of binding with a target analyte. Additionally, the system comprises a polymer film, which may include a metal coating, upon which is printed a specific, predetermined pattern of analyte-specific receptors. Upon attachment of a target analyte to select areas of the polymer film, either directly or with the diffraction enhancing element, diffraction of transmitted and/or reflected light occurs via the physical dimensions and defined, precise placement of the analyte. A diffraction image is produced which can be easily seen with the eye or, optionally, with a sensing device.

(57) Abrégé

L'invention concerne un procédé et un système sensibles et bon marché de détection d'analytes présents dans un milieu. Ce système comprend un élément de rehaussement de la diffraction, comme des microsphères fonctionnalisées, lesquelles sont modifiées de telle manière qu'elles puissent se lier à un analyte cible. En outre, le système comprend un film polymère, lequel peut comporter un revêtement métallique, sur lequel est imprimé un motif prédéterminé et spécifique d'un récepteur, lequel est à son tour spécifique d'un analyte. Lors de la fixation d'un analyte cible sur des zones choisies du film polymère, soit directement, soit au moyen de l'élément d'accroissement de la diffraction, la diffraction de la lumière transmise et/ou réfléchie s produit par l'intermédiaire des dimensions physiques et détermine l'emplacement précis de l'analyte. Une image de diffraction est produite qui peut être facilement vue à l'oeil nu, ou le cas échéant, avec un dispositif détecteur.

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(54) Title: PATTERNED BINDING OF FUNCTIONALIZED MICROSPHERES FOR OPTICAL DIFFRACTION-BASED BIOSENSORS

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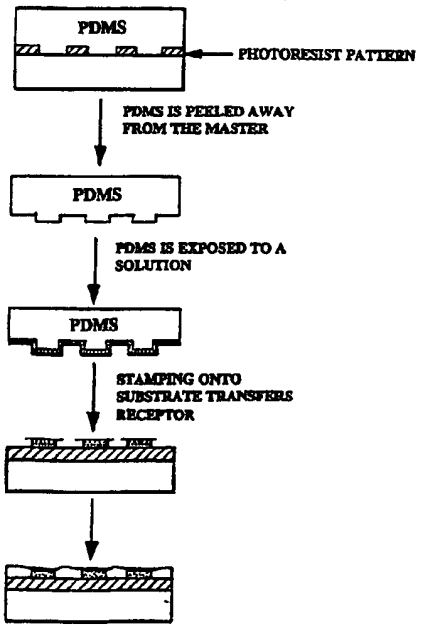
The present invention provides an inexpensive and sensitive system and method for detecting analytes present in a medium. The system comprises a diffraction enhancing element, such as functionalized microspheres, which are modified such that they are capable of binding with a target analyte. Additionally, the system comprises a polymer film, which may include a metal coating, upon which is printed a specific, predetermined pattern of analyte-specific receptors. Upon attachment of a target analyte to select areas of the polymer film, either directly or with the diffraction enhancing element, diffraction of transmitted and/or reflected light occurs via the physical dimensions and defined, precise placement of the analyte. A diffraction image is produced which can be easily seen with the eye or, optionally, with a sensing device.



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INTERNATIONAL SEARCH REPORT

International Application No
PCT/US 99/27671

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 G01N33/553 B41M3/00 G01N21/47

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 G01N B41M

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X Y	WO 98 27417 A (KIMBERLY CLARK CO) 25 June 1998 (1998-06-25) page 9, line 20 -page 10, line 10; claims 1-49; examples 1-8	23-36,41 1-22, 37-40
Y	WO 94 15193 A (SIENNA BIOTECH INC) 7 July 1994 (1994-07-07) page 21, line 17-21	19-22, 37-40
Y	US 5 599 668 A (STIMPSON DONALD I ET AL) 4 February 1997 (1997-02-04) column 15, line 18-57 column 23, line 29-39	19-22, 37-40
Y	WO 96 29629 A (HARVARD COLLEGE) 26 September 1996 (1996-09-26) page 24, line 26 -page 25, line 13	1-22

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[X] Further documents are listed in the continuation of box C. [X] Patent family members are listed in annex.

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Date of the actual completion of the international search	Date of mailing of the international search report
31 May 2000	07/06/2000

Name and mailing address of the ISA	Authorized officer
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INTERNATIONAL SEARCH REPORT

In ational Application No
PCT/US 99/27671

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication,where appropriate, of the relevant passages	Relevant to claim No.
A	MRKSICH M ET AL: "PATTERNING SELF-ASSEMBLED MONOLAYERS USING MICROCONTACT PRINTING: A NEW TECHNOLOGY FOR BIOSENSORS" TIBTECH,GB,CAMBRIDGE, vol. 13, 1 June 1995 (1995-06-01), pages 228-235, XP002060826 the whole document	1-41

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Form PCT/ISA/210 (continuation of second sheet) (July 1992)

INTERNATIONAL SEARCH REPORT

Information on patent family members

Int Sional Application No
PCT/US 99/27671

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 9827417 A	25-06-1998	US 5922550 A	13-07-1999
		AU 5615698 A	15-07-1998
		CN 1246179 A	01-03-2000
		EP 0946865 A	06-10-1999
WO 9415193 A	07-07-1994	AU 670489 B	18-07-1996
		AU 5873494 A	19-07-1994
		CA 2151060 A	07-07-1994
		CN 1092866 A	28-09-1994
		EP 0676045 A	11-10-1995
		JP 8505231 T	04-06-1996
		KR 171452 B	01-05-1999
		US 5589401 A	31-12-1996
US 5599668 A	04-02-1997	AU 3636295 A	09-04-1996
		CA 2197321 A	28-03-1996
		EP 0783683 A	16-07-1997
		JP 10506190 T	16-06-1998
		WO 9609532 A	28-03-1996
		US 5843651 A	01-12-1998
WO 9629629 A	26-09-1996	EP 0812434 A	17-12-1997
		US 5900160 A	04-05-1999